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AUTHOR Vaatstra, Rina F.; And Others
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ABSTRACT

Medical expertise research methods were used to explore the relationship between auditing expertise and case representation. Subjects were 8 first-year economy students, 8 fourth-year auditing students, 8 postgraduate students in auditing, and 8 experienced auditors in the Netherlands, ranging in experience from only a limited knowledge of bookkeeping to experience of over 12 years. Subjects were presented with three different cases that they diagnosed and recalled. Results show that the level of expertise has a significant effect on the accuracy of subjects' diagnoses and inferred recall, although subjects did not differ significantly in literal recall. It is concluded that hypotheses generalized from medical expertise research are to a great extent applicable to the auditing domain. It may also be that subjects process descriptive and numerical information in different ways. Three figures illustrate the discussion. (Contains 11 references.) (SLD)

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Expertise in Auditing: Case representation differences between economy students, novice, intermediate and expert auditors

Rina F. Vaatstra, Henny P.A. Boshuizen & Henk G. Schmidt
Department of Educational Research & Development
University of Limburg
The Netherlands

Paper presented at the Annual Meeting of the American Educational Association, Atlanta, 12-16 April, 1993.

Correspondence:
R.F. Vaatstra
PO Box 616
6200 MD Maastricht
The Netherlands
e-mail: H.Vaatstra@educ.rulimburg.nl

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Abstract

In the present study medical expertise research methods are used to explore the relationship between auditing expertise level and case representation. The subjects were presented three different cases, which they diagnosed and recalled. The results showed that level of expertise did have a significant effect on accurateness of diagnosis and inferred recall, yet subjects did not differ significantly in literal recall.

Introduction

Auditing expertise studies emphasizing knowledge structures have started in the late 1980's (Libby, 1985; Choo, 1989). Presently, an adequate theoretical basis is still missing. Since research on knowledge structures in the domains of physics and the medicine have started earlier and probably progressed more, auditing expertise research might benefit from research methods developed in these domains. For two reasons the medical domain might be important for the auditing field. First, the educational program of both physicians and auditors consists of a theoretical and a practical part. Second, according to Ashton, Kleinmuntz, Sullivan & Tomassini, (1988) and Boshuizen & Schmidt (1992), at a generic level the task of a physician and an auditor is essentially the same. Like a physician, an auditor diagnoses and if necessary provides treatment. The diagnostic task we are referring to is the audit of financial statements. Auditors use different types of key controls to arrive at several partial diagnoses before they decide whether a financial statement is in accordance with established criteria. Key controls are for example the separation of duties, the existence of an approved price list or the presence of possible errors in the financial statements.

Since the same generic task may require the same kind of knowledge structures (Boshuizen & Schmidt, 1992) and research on medical expertise has further developed than auditing expertise research, we took expertise research from the medical domain as a theoretical basis for this study.

In the medical domain two dependent variables have been described which show a clear relationship with expertise level: quality of diagnosis and amount of recall. The relationship between expertise level and quality of diagnosis was examined by Boshuizen (1989), Boshuizen and Schmidt (1992) and Feltovich, Johnson, Moller and Swanson (1984). All researchers found an increasing accuracy

of diagnosis with increasing expertise. Recall studies assume that recall reflects aspects of the internal representation of a problem, a more coherent and extensive representation would result in more and better recall. This hypothesis was supported by Norman, Brooks and Allen (1989). The observation was however complicated by other research outcomes in which an inverted U-shaped relation was found between expertise level and recall (Muzzin, Norman, Feighner & Tugwell, 1983; Patel & Medley-Mark, 1985; Schmidt & Boshuizen, 1993). Contrary to the other studies, Norman et al. (1989) used numerical stimuli. These numerical stimuli might have forced subjects into an analytic processing mode computing and comparing data and deducting conclusions from them. The verbal case descriptions used by Muzzin et al. (1983), Patel and Medley-Mark (1985) and Schmidt and Boshuizen (1993) might have called for direct schema activation and instantation, not requiring any analytic activity. This difference in processing mode might have caused the different shapes of the relations between expertise and recall found in the studies. Since auditing is predominantly a numerical domain, it might be expected that the linear results by Norman et al. (1989) could be generalized to the auditing domain.

In addition there appears to be a distinction between literal recall and inferred recall, Boshuizen and Schmidt (1992) and Coughlin and Patel (1986) found an increase of inferences with increasing expertise.

In summary, studies in auditing are expected to display results similar to those found in medicine. Accuracy of diagnosis, literal recall and inferences may vary linearly with expertise level.

Method

Subjects. Eight first-year economy students, eight fourth-year auditing students, eight post-graduate students and eight experienced auditors participated in this study. The first-year students had only limited knowledge of bookkeeping. The fourth-year students almost had their masters degree, they did not have any practical experience in auditing. The post-graduate subjects worked as in-charge auditors and were part-time students in a post-graduate training program at the University of Limburg. Their practical experience equalled 5 years on the average. The fourth group consisted of certified public accountants, who were auditors with an average experience of 12.5 years. These experts worked in different auditing firms.

Material. The stimulus material consisted of a description of the internal control structure, a balance sheet and a profit-and-loss account on paper, which is a summary of the information an auditor gets in real life. There were three different types of business organizations: a Wholesale company, a Contractor firm and a Foundation. Case length was one page.

Procedure. Subjects were told that three cases would be presented and that it would be their task to write down their diagnoses and recall. They studied the cases as long as they wished. After that it was not allowed to look at the cases any longer. Total duration was one and a half hour for almost every subject. Case presentation order was balanced over subjects.

Analysis. Subjects' diagnoses were compared with a list of eleven diagnoses which considered internal control information, balance sheet and profit-and-loss account figures. This list of diagnoses was taken as a standard list. Examples of these diagnosis are seperation of functions, various warehouses, finance ratios, money lend, high interest. For each case, the maximum diagnostic score was eleven.

Free recall protocols were divided in small meaningful information units referred to as propositions. These propositions were matched to the case propositions. Amount of literal recall was determined by counting the number of propositions similar to case propositions. These raw scores were corrected for differences in case length by dividing it by the total number of case propositions.

Inferred recall consisted of the number of correct conclusions and interpretations based on two or more case propositions.

All data were analysed by means of a four (levels of expertise) by three (cases) by three (presentation order) analyses of variance with repeated measures.

Results and Discussion

Diagnostic Accuracy On the next page, figure 1 shows the average number of accurate diagnoses proposed by the subjects. As predicted the experts produced a more accurate diagnosis than the other subjects, $F(3,28) = 46.12$, $p < .0001$. Yet, the figure shows that the expected linearity is not at hand. Although each standard diagnosis contained the same number of elements, fourth-year, post-graduate and experts mentioned most diagnoses in the Foundation case. There was a significant case effect, $F(2,26) = 5.19$, $p < .009$. Probably, subjects diagnosed the Foundation case better than the other cases, because of the relatively clearer distinction between cycles (sales, purchase, inventory, debt, etc.).

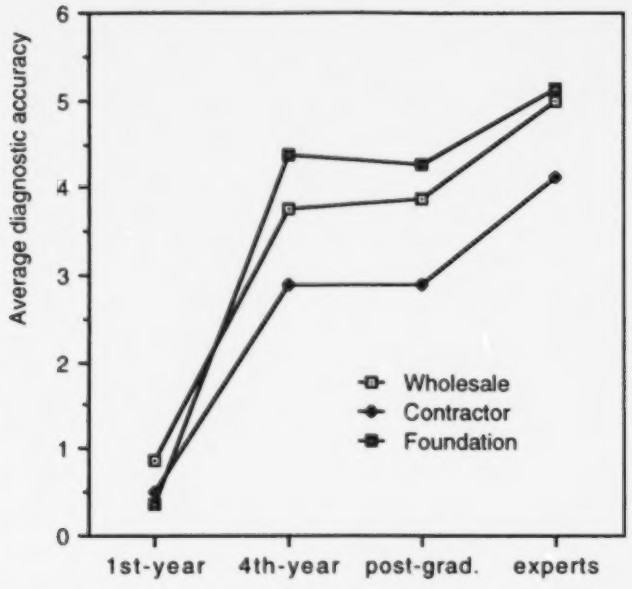

Figure 1. Average diagnostic accuracy as a function of level of expertise

Amount of Literal Recall In figure 2 the average percentage of recall is presented. No significant effect of expertise was found, $F(3,26) = .851$, $p < .479$. Cases did have a significant effect on literal recall, $F(2,26) = 9.52$, $p < .0003$. The Contractor case and the Wholesale case showed some differences between the subjects, the Foundation case did not result in different recalls.

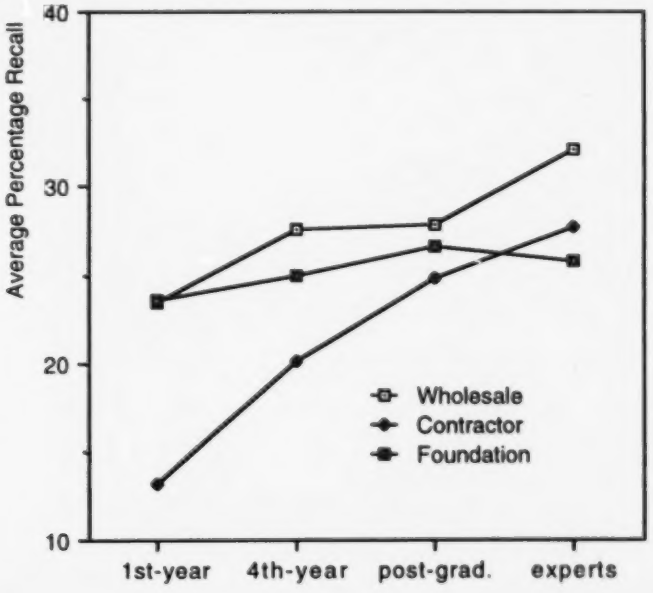

Figure 2 Average percentage of literal recall as a function of level of expertise

Inferences in Recall Figure 3 depicts the average amount of inferences in recall. Expertise had a significant effect on the number of inferences, $F(3,26) = 8.76$, $p < .0003$. This result supported the hypothesis that the more experienced an auditor, the more inferences he makes. The cases also had a significant effect, $F(2,26) = .4.24$, $p < .0198$. The Contractor case leads to more inferences overall. According to the expert subjects this case was considerably more complex than the other ones. Data on diagnosis in Figure 1 support this observation. In general, this might indicate that subjects make more inferences in the recall as the presented information demands more processing capacity.

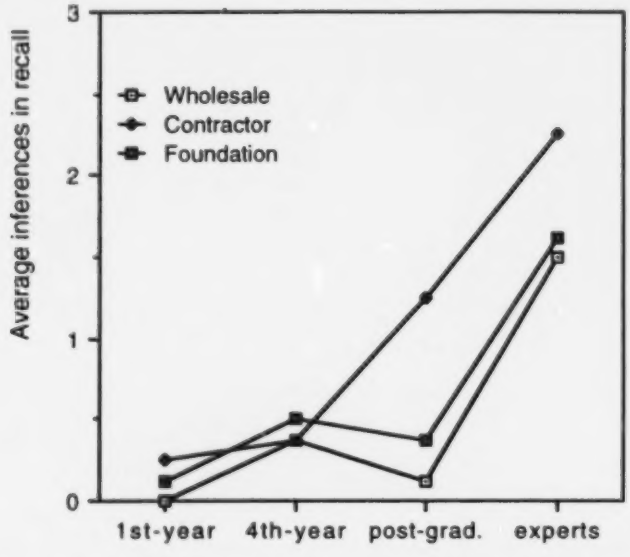

Figure 3 Average inferences in recall as a function of expertise.

In summary, it can be concluded that the hypotheses generalized from medical expertise research are to a great extent applicable to the auditing domain. Expertise had a significant effect on diagnostic accuracy and number of inferences in recall. Yet, expertise did not result in a significant effect on recall. The explanation for not finding this effect may have been the type of stimulus material we used. The material consisted of two different types of information, descriptive and numerical information. It is possible that subjects process these types of information in different ways. Further qualitative analyses will be discussed during the presentation of this paper at the AERA meeting.

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